

## **ITEM 06555.72nm – ARCHITECTURAL TREATMENT OF VERTICAL CONCRETE SURFACES**

### **DESCRIPTION**

This work shall consist of furnishing and installing formliners to produce the architectural treatments to the surface(s) of Portland cement concrete retaining walls, structures, or other vertical surfaces with a designated pattern and texture as shown in the contract documents. All work shall be in accordance with these specifications and in reasonably close conformity to the lines, grades and patterns shown on the plans or as established by the Engineer.

The process of formlining and texturing of the concrete shall be performed in strict accordance with the manufacturer's recommendations, the contract documents and as approved by the Engineer and Regional Landscape Architect.

Design and pattern of formlined concrete surfaces shall follow the manufacturer's standard drawing for premanufactured formliner types or the approved shop drawings for the custom formliner types. The completed formed concrete surface shall match the color and texture of the approved sample panel.

### **MATERIALS**

**Formliner Panels.** Premanufactured formliner panels shall be capable of imprinting the surface of the concrete with a uniform and aligned pattern and texture. The panels shall be composed of elastomeric urethane, polyvinyl chloride (PVC), ABS or other suitable material for their intended shape and number of reuses to achieve the desired effects established in the approved sample panel(s). Formliners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of formliner patterns. Contractor shall plan on having sufficient liners available to minimize pattern repeat. Formliners shall not compress more than 6mm (¼ inch) when concrete is poured at a rate of 3 vertical meters per hour. Formliners shall be removable without causing deterioration of the surface or underlying concrete. Formliner panels shall be submitted to the Engineer for approval prior to their use.

Custom built formliners shall have form facing materials (material in contact with concrete) consisting of plywood, tempered concrete-form-grade hardboard, metal, plastic or other acceptable materials capable of producing a smooth, uniform texture on the concrete. Do not use form facing materials with raised grain, torn surfaces, worn edges, patches, dents, or other defects that will impair the texture of concrete surfaces.

The final concrete finish shall be attained by using one of the following formliners for each type:

Type 1 Formliner:                    'Random Cut Stone' custom formliner for Retaining Wall and MSES wall treatment types as shown in contract documents.

**ITEM 06555.72nm – ARCHITECTURAL TREATMENT OF VERTICAL CONCRETE SURFACES**

Type 2 Formliner: ‘Heavy Sandblast’ pre-fabricated formliner for textured concrete surface. See contract documents.

Type 3-7 & 9-12 Formliners: ‘Shadow box’ and ‘coping treatment’ custom formliners to provide stepped smooth concrete surfaces as shown in contract documents.

Type 8 Formliner: ‘Stone Quoining Effect’ custom formliner for bridge abutments as shown in contract documents.

Type 13-15 Formliners: ‘V-GROOVE’ Text/Road Name treatment area with recessed lettering as shown in contract documents

**Releasing Agents.** When the manufacturer requires the use of an agent to facilitate the release of the formliner panel from the concrete, or when its use is specified on the plans, such agent shall be non-staining and evenly spread over the entire liner surface. Formwork for custom formliners shall also be treated as needed. Form release material shall be on the NYSDOT’s Approved List of Manufacturers and compatible with the formliner material.

**Form Ties.** Plastic tie cones shall be used with ferrous form ties for Type 8 formliner and shall be designed to separate at least 40mm (two inches) back from deepest reveal of formed surface, leaving only a neat hole that can be plugged with patching material. Fiberglass ties shall be colored gray to match concrete and shall be ground off to finished surface.

**Caulking Compound.** A polyurethane caulking compound color-matched to the concrete shall be used to seal construction joints.

**Patching Material.** The patching material, technique, and match with adjacent surfaces shall be approved by the Engineer prior to any patching. Plastering of surfaces will not be allowed. The surface of all such repaired surfaces shall be carefully removed before setting occurs.

**CONSTRUCTION DETAILS**

**Quality Assurance.** Manufacturer of pre-fabricated formliners – five years experience making molds to create textured concrete surfaces as specified in contract documents. Submit documentation with shop drawings.

Contractor/Subcontractor (installer) – five years experience pouring vertically formed architectural concrete. Trained in manufacturer’s special techniques (formliner assembly, grout line staining, etc.) in order to achieve realistic surfaces. Submit resumes, references, and photographs/locations of prior work examples with shop drawings.

**ITEM 06555.72nm – ARCHITECTURAL TREATMENT OF VERTICAL CONCRETE SURFACES**

Pre-Installation Meeting – schedule meeting with manufacturer’s representative, installer, Owner, and Engineer to assure understanding of simulated stone masonry use, requirements for construction of mock-up, and to coordinate the work.

**Submittals.** Contractor shall submit for approval:

Catalog cuts, manufacturer’s literature, and technical data for the materials specified herein, including but not limited to simulated stone mold pattern, formliner, release agent, and concrete patching material;

Photographs – color photographs of three similar past projects of the manufacturer;

Samples – form ties, sample and description, showing method of separation when forms are removed;

Shop Drawings – plans, elevations, and details to show overall pattern layout, joint locations, form tie locations, and end, edge, and other special conditions; and

A table or schedule indicating the reuse cycle and sequence of the work for each cast-in-place wall system. Formliner forms shall remain in place after the pour for approximately the same amount of time for each pour to keep rates of cure and color uniform and consistent for each treatment area.

**Formliners.** Formliners shall be placed in the perimeter forms in such a way that the treatment pattern and jointing is achieved.

The general construction details of subsection 555-3 shall apply along with the following:

**Sample Panel.** At least 60 days prior to placing any architectural treatment on vertical concrete surfaces, as part of this item, Contractor shall construct the following vertical sample panels, on the site for the Engineers approval, using the contemplated materials, work force and construction techniques.

Sample Panel 1: The sample panel shall include Type 1 formliner and display the pattern specified in the contract documents. The panel shall measure a minimum of 1.5 m in height, 1.5 m in width, and 0.3 m in thickness.

Sample Panel 2: The sample panel shall include Type 2 and Type 8 formliners and display the configurations of the formliners as shown in the contract documents. The sample panel shall also display two (2) typical ‘dummy joints’ as specified in the contract documents. The panel shall measure a minimum of 2.5 m in height, 2.0 m in width and 0.3 m in thickness.

## ITEM 06555.72nn – ARCHITECTURAL TREATMENT OF VERTICAL CONCRETE SURFACES

Sample Panel 3: The sample panel shall include Type 3, 6 and 7 formliners and display the configurations of the formliners as shown in the contract documents. The panel shall measure a minimum of 1.75 m in height, 3.0 m in width, and 0.3 m in thickness.

Sample Panel 4: The sample panel shall include Type 12 formliner and display the configuration of the formliner as shown in the contract documents. The panel shall measure a minimum of 0.905 m in height, 1.5 m in width, and 0.3 m in thickness.

Sample Panel 5: The sample panel shall include Type 13 formliner and display the configuration of the formliner with the word 'Central' as shown in the contract documents. The panel shall measure a minimum of 0.905 m in height, 3.5 m in width and 0.3 m in thickness.

The selected cement, aggregates, formwork, formliner materials, snap-ties, spacers, inserts, and release agents should be used and the surface finished (blastcleaned or rubbed) after curing. Snap-tie holes and other blemished areas shall be patched on the sample panels to develop an acceptable patch texturing treatment. The sample panels may become part of the final vertical surface if considered feasible and acceptable by the Engineer. When the sample panels are not part of the final product, they shall not be removed and disposed of until after all of the architecturally treated concrete work has been completed.

**Forming.** Joints between panels, tie hole penetrations, and joints between liner panels and rustications shall be sealed, taped or fused to form a watertight seam, according to the manufacturer's instructions. Unless specified on the plans, texturing is not required on surfaces, which will be below finished grade. Plastic snap tie cones are to be of the non-leaking type. Metal form ties are not to be placed closer than 40 mm to the interior surface.

Construction joints shall extend to the full depth of the concrete at the locations shown on the plans. When the locations of the joints are not specified on the plans, the Contractor and the Engineer shall agree on the proper locations of such joints so as to not distract from the appearance of the stone pattern, architectural treatment, or 'V-groove' lettering and to minimize the possibilities of cracking.

Form ties shall be located to the greatest extent possible to fall within the simulated grout lines.

Contractor shall securely attach formliners to forms with wood or sheet metal screws; threaded inserts added to the back of the formliner for bolts to fasten the formliner through the forms; or bolted through the face of the formliner with flat head bolts inserted in a pattern joint and through the formliner forming system. Construction adhesives may be used, but not on reusable forms. Place adjacent formliners with less than 6mm (1/4 inch) separation between formliners.

## **ITEM 06555.72nn – ARCHITECTURAL TREATMENT OF VERTICAL CONCRETE SURFACES**

Only manufacturer recommended and state approved form release agents shall be utilized and shall be applied to the formliners before the concrete is poured. Release agents shall be applied in strict accordance with release agent manufacturer recommendations. Hand-charged sprayers will only be allowed if a thin uniform coating of release agent is obtained on the form, and with Engineer approval.

### **Finishing and Patching**

Type 1, 2 and 8 formliners: After removal of the formwork, all vertical surfaces shall be blastcleaned to remove minor form marks and colored residue resulting from release agents, or water and cement migrating (bleeding) toward the surface during concrete placement and compaction.

Patchwork shall be completed at all snap-tie holes and other blemished areas larger than 19mm ( $\frac{3}{4}$  inch) in greatest principal direction, unless otherwise specified on the plans or as directed by the Engineer. Patching shall not take place until the entire vertical surface is blastcleaned. Patchwork shall then be completed using approved patching material such as Tamms Speedcrete or equal mixed with latex or acrylic bonder, with texturing treatments deemed acceptable on the sample panel. All honeycombed areas shall be filled and textured to match surrounding areas. Seam lines and other unnatural protrusions shall be ground down to match adjacent areas with a hand-held power grinder using discs made for concrete. Grinding of seams shall be performed immediately after removal of the formliners. Perform final bush hammering to blend defects and ground areas into the final rock texture. All areas requiring patchwork shall first be thoroughly moistened and treated with a concrete bonder. A liquid curing membrane should not be used. In particular, the process of wall patching and preparation will be subject to approval of the manufacturer and Engineer.

All construction joints shall be sealed with a color-matched polyurethane caulking compound applied in accordance with the manufacturer's instructions.

Type 3 through 7 and 9 through 15 formliners: Remove forms as early as permitted in subsection 555-3, and immediately have all projections and irregularities carefully removed, and all tie holes and cavities neatly filled with mortar of the proportion used in the concrete. The same brand of cement and the same kind of aggregate shall be used for filling cavities as was used in the original concrete mix. Plastering of surfaces shall not be allowed. The surface film of all such repaired surfaces shall be carefully removed before setting occurs.

Produce a smooth-rubbed finish on newly hardened concrete. The smooth-rubbed surface shall be completed no later than the day following formwork removal. Wet the surface and rub it with carborundum brick or other abrasive until uniform color and texture are produced. Use no cement grout other than cement paste drawn from the concrete itself by the rubbing process.

**ITEM 06555.72nn – ARCHITECTURAL TREATMENT OF VERTICAL CONCRETE SURFACES**

All construction joints shall be sealed with a color-matched polyurethane caulking compound applied in accordance with the manufacturer’s instructions.

**METHOD OF MEASUREMENT**

Architectural Treatment of Vertical Concrete Surfaces will be measured as the number of square meters of concrete imprinted to the satisfaction of the Engineer and Regional Landscape Architect, including the sample panel. The quantity will be as computed from payment lines shown on the plans or as ordered by the Engineer.

**BASIS OF PAYMENT**

The unit price bid per square meter shall include the cost of the formliners, releasing agents, patch mix, finishing, caulking compounds, sample panels and all other materials, equipment, and labor necessary to complete the work as specified, except that concrete and reinforcement will be paid for separately under its appropriate item.

Payment will be made under:

<b>Item No.</b>	<b>Item</b>	<b>Pay Unit</b>
06555.7201	Formliner Type 1, 2 and 8	SM
06555.7202	Formliner Type 3-7 and 9-12	SM
06555.7203	Formliner Type 13-15	SM